No. 682,020. Patented Sept. 3, 1901.

C. H. BELL.

TYPE WRITER.

(Application filed Dec. 29, 1898.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1

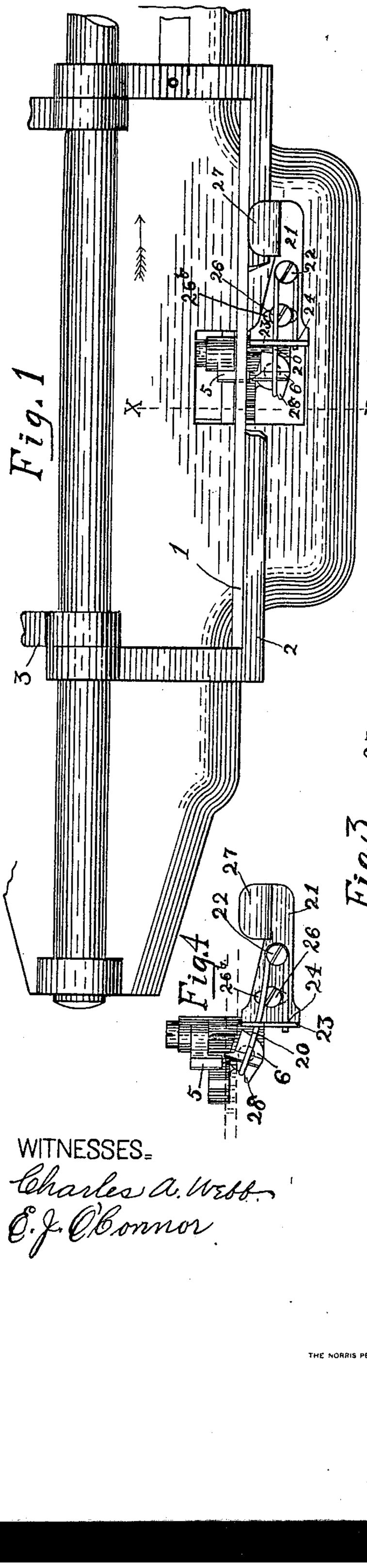

Fig. 2

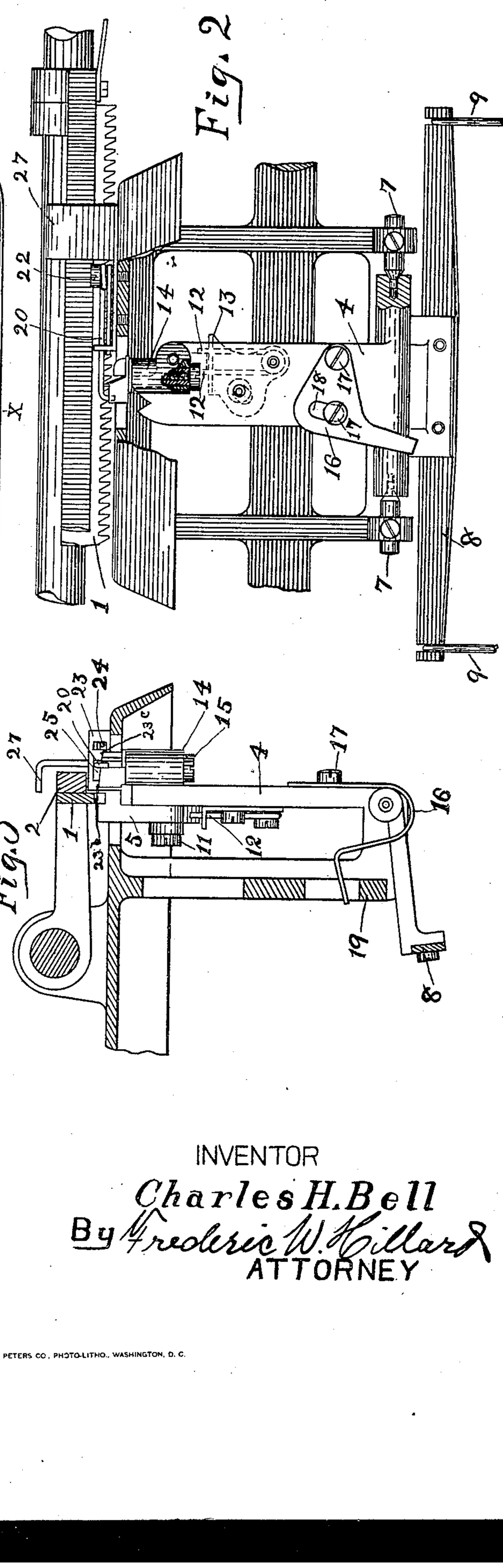

Fig. 3

Fig. 4

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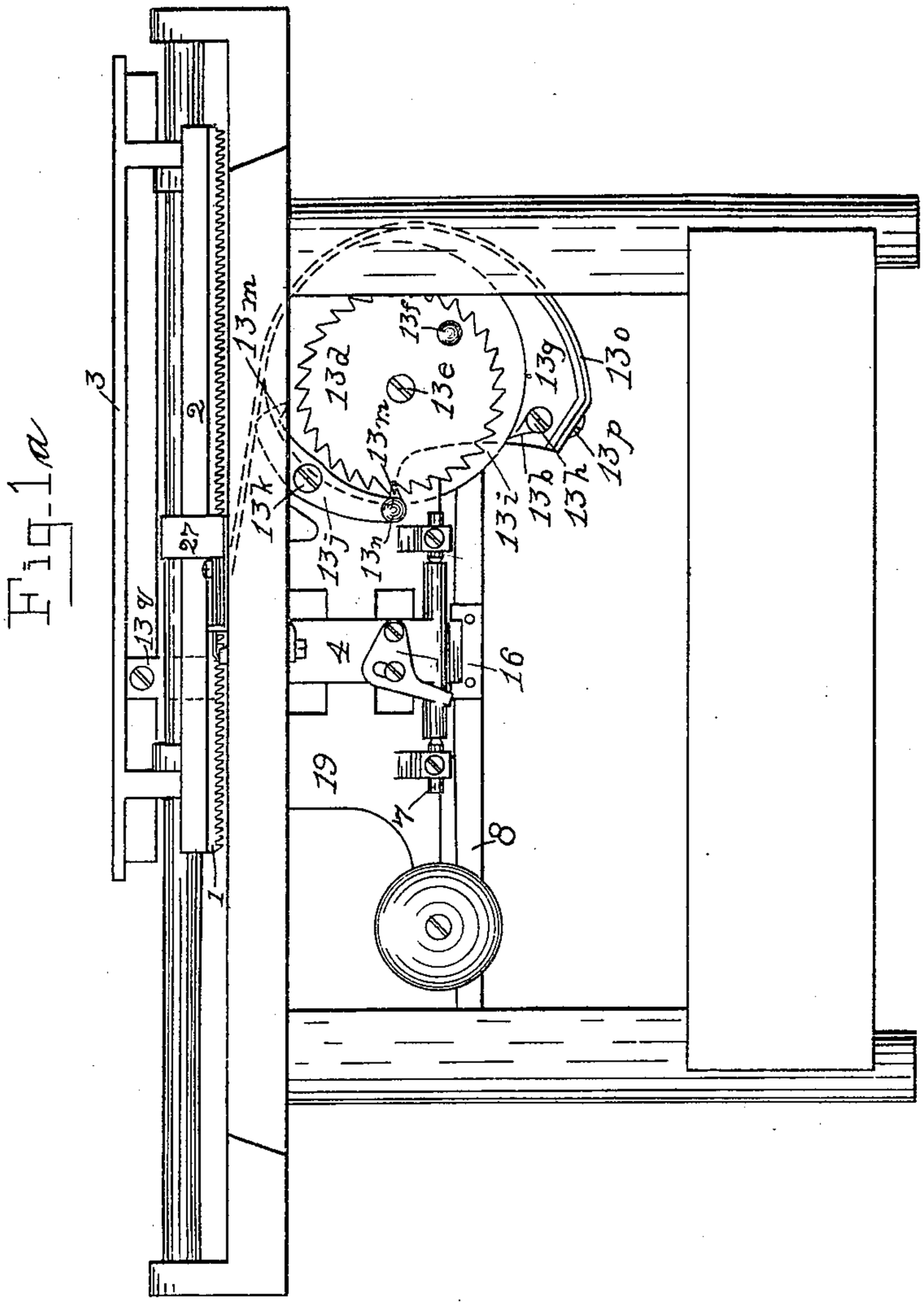
(No Model.) 4 Sheets—Sheet 2.

Fig. 1a



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TYPE WRITER.

(Application filed Dec. 29, 1898.)

(No Model.)

4 Sheets—Sheet 3.

FIG. 1.

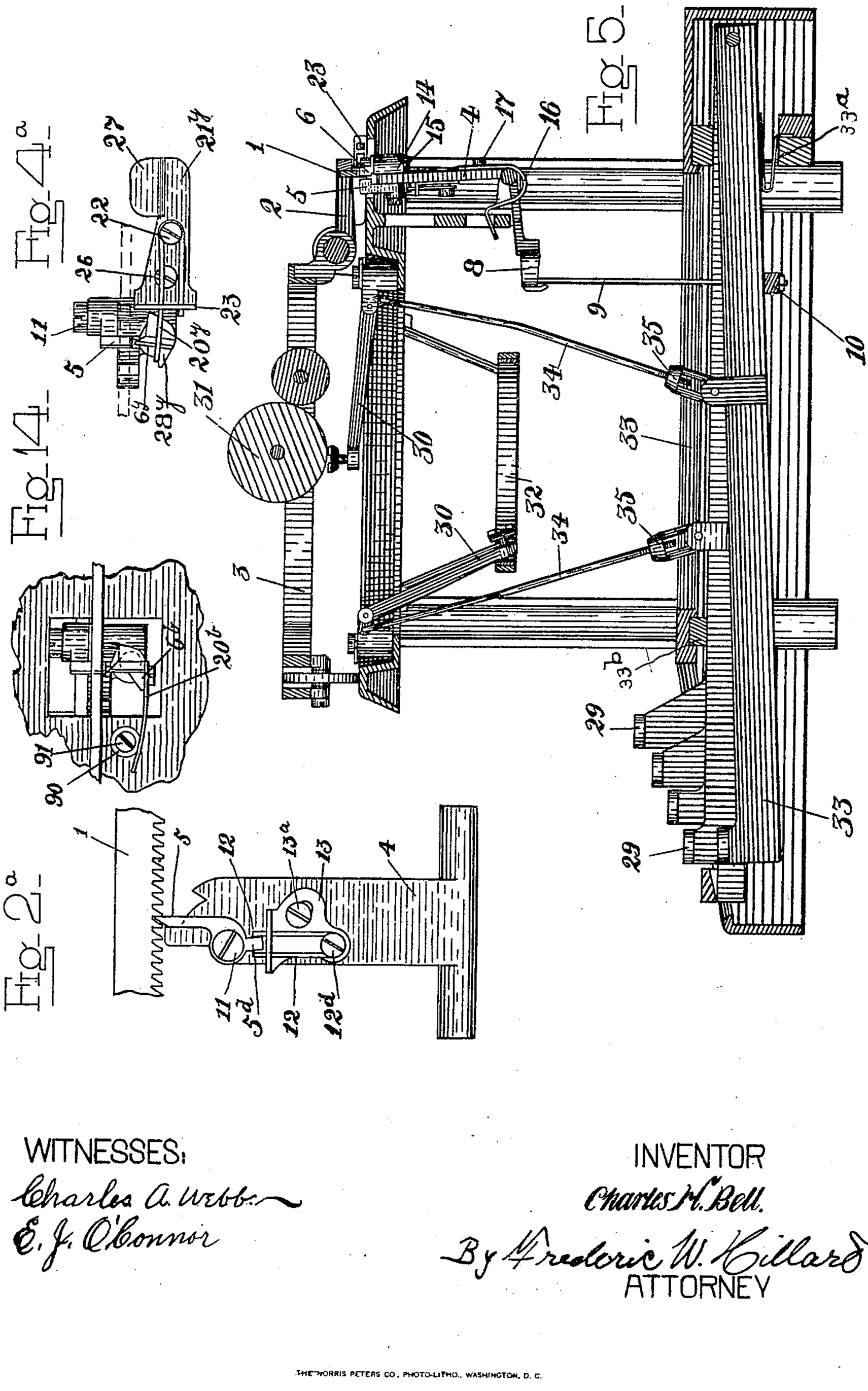

FIG. 2.

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(No Model.) 4 Sheets—Sheet 4.

Fig. 6

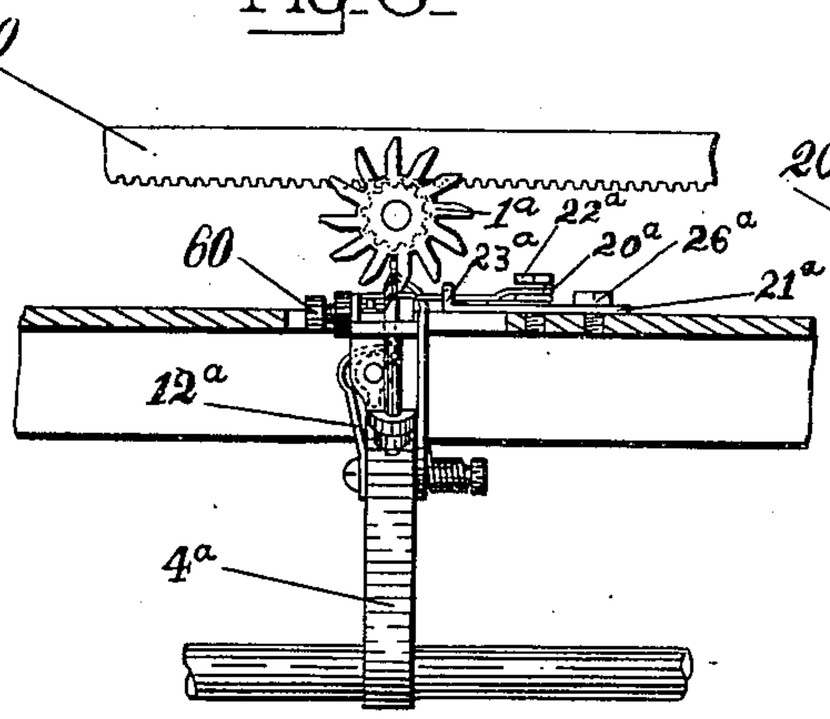


Fig. 7

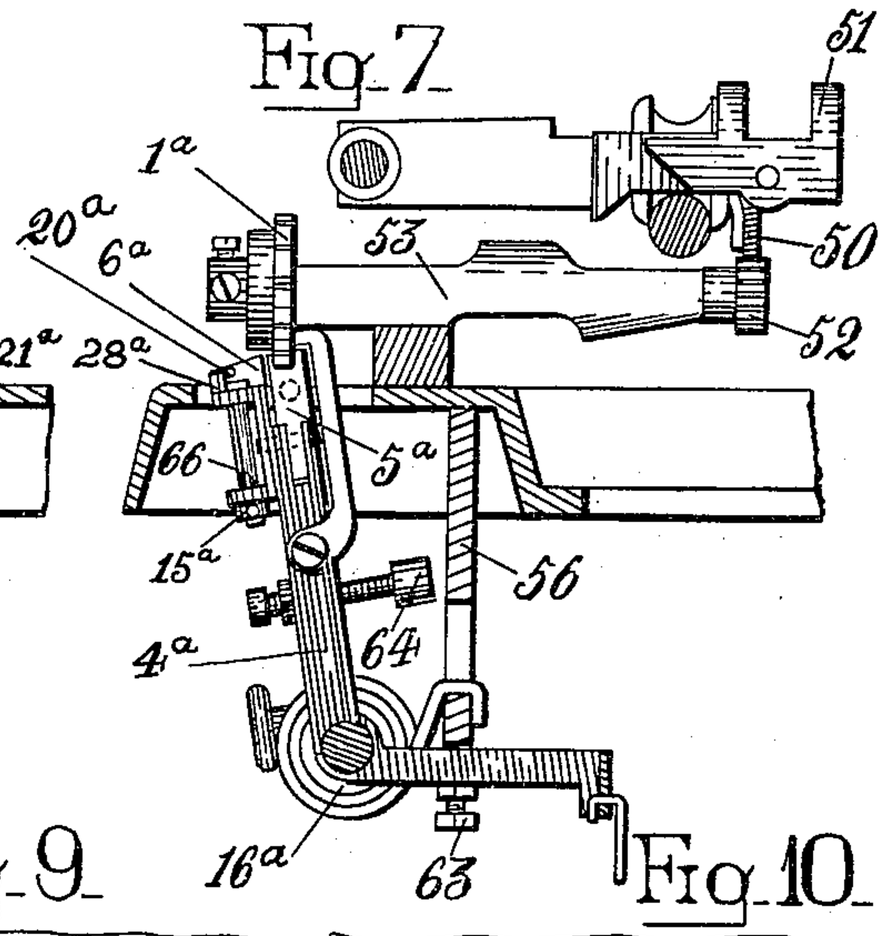


Fig. 8

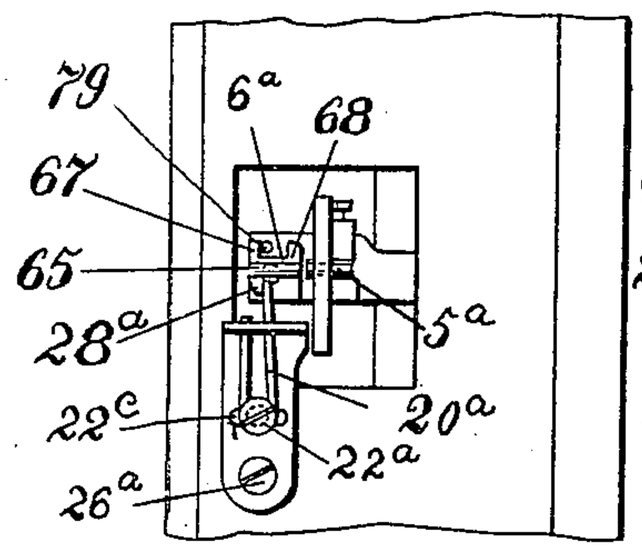


Fig. 9

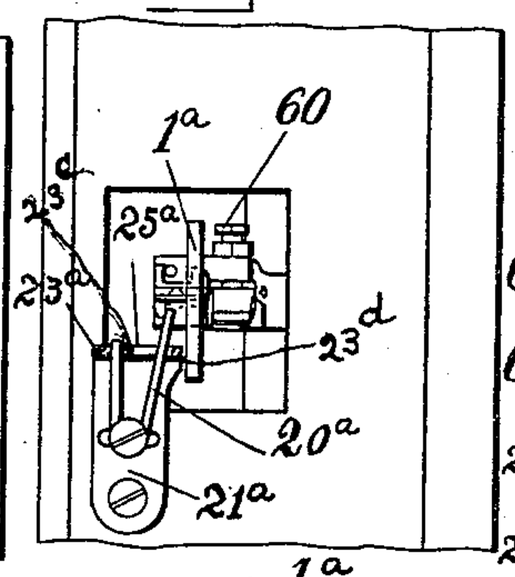


Fig. 10

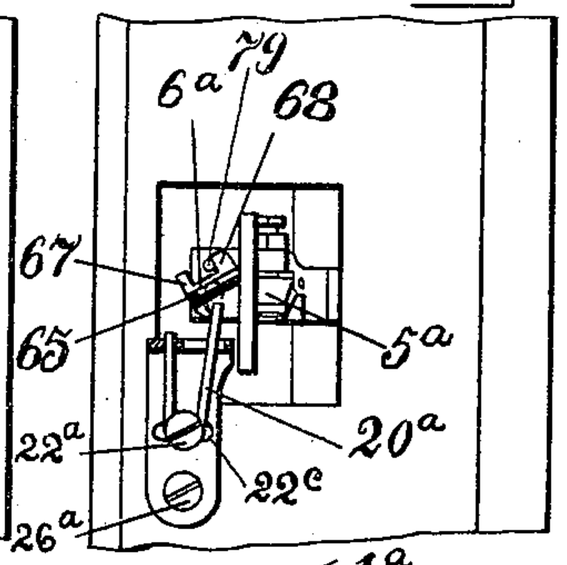


Fig. 11

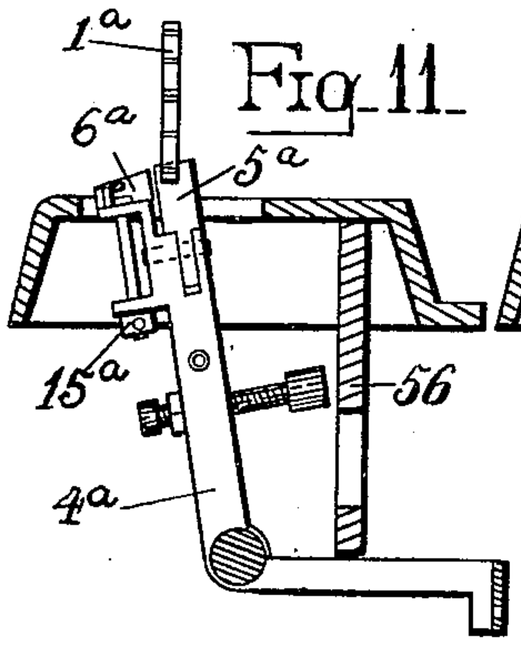


Fig. 12

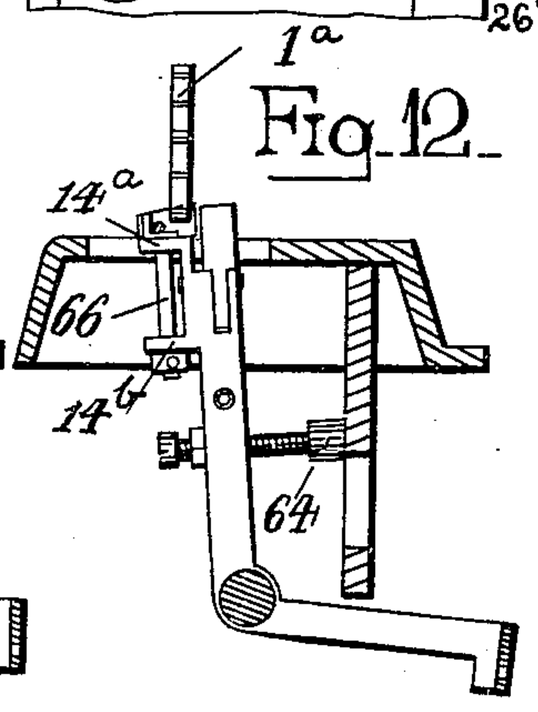
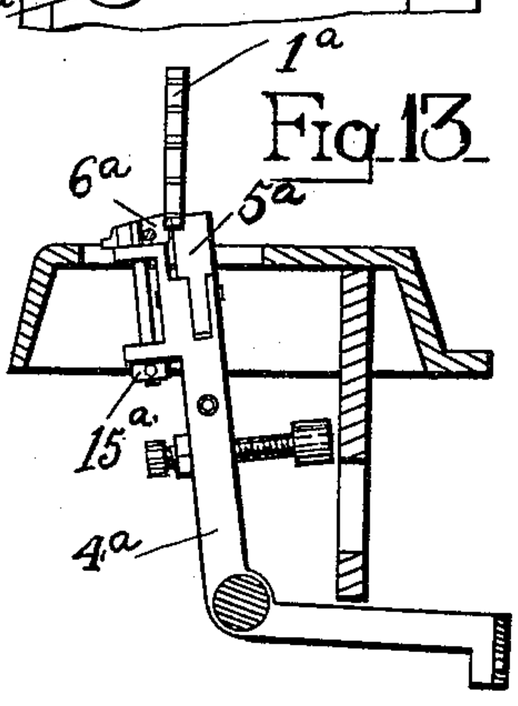


Fig. 13



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UNITED STATES PATENT OFFICE.

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TYPE-WRITER.

SPECIFICATION forming part of Letters Patent No. 682,020, dated September 3, 1901.

Application filed December 29, 1898. Serial No. 700,641. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. BELL, a resident of the borough of Brooklyn, in the county of Kings and city and State of New York, have invented certain new and useful Improvements in Type-Writers, of which the following is a specification.

My invention is an improvement in the escapement mechanism of type-writing machines; and it consists in a device for increasing the speed of the carriage-feed and for reducing the force necessary to operate the escapement.

In the accompanying drawings, which form a part of this specification, I have shown my invention applied to the No. 2 Remington type-writer and to the No. 6 Remington type-writer, the first-mentioned machine being provided with a straight rack mounted upon the carriage and movable therewith and engaging with the escapement-dogs and the latter being provided with a wheel-escapement.

My invention is broadly applicable with the various styles of escapement-racks and with many styles of escapement-dogs known in the art.

I use the terms "rack" and "escapement" wheel interchangeably herein, the former being generic and the latter specific and included within the genus rack. In the claims where I employ the term "rack" I intend to include within the meaning of that term escapement-wheels and all known styles of racks.

In the machines which I show the paper is mounted upon and feeds with the carriage; but of course my invention is applicable to other machines—as, for example, those in which the carriage supports and feeds the printing mechanism.

In the drawings only such parts are shown as are necessary to illustrate my invention.

Figures 1 to 5, inclusive, show my escapement adapted to the No. 2 Remington type-writer. Figs. 6 to 13, inclusive, show my invention applied to the No. 6 Remington type-writer. Fig. 14 shows a detail modification of my invention applied to the No. 2 Remington type-writer. Fig. 1 is a plan view of the rear part of the type-writer. The contour of the top plate or frame of the machine is curved at the rear differently from the No. 2 Remington type-writer, and the rack is shown shorter than the No. 2 Remington type-writer rack, so as to make room for the other figures on the sheet; but the dogs and the dog-carrying rocker-frame and the rack-teeth and all essential parts of the escapement are shown in the manner in which I have adapted them to and am using them upon the No. 2 Remington type-writer. Fig. 1ª is a view of so much of the rear of the type-writer, seen from behind the machine, as is necessary to show the mechanism of the carriage-propelling power, the connection of such mechanism with the carriage to propel the carriage, and the escapement mechanism whereby the propelling influence of the carriage-driving power is restrained and controlled. Fig. 2 is a side view of the escapement and of parts of the supporting-frame on the machine seen from the rear. Fig. 2ª is a side view of the rocker-frame and parts thereon as seen from the front of the machine. Fig. 3 is a view of the escapement, seen from the left of the machine, looking along the rack in the direction of the arrow of Fig. 1. This figure is a sectional view on the line X X of Fig. 1. Fig. 4 is a detail plan view of the dogs and of the spring and spring-holder for the swiveling dog. This figure is a positional view of the parts at the end of the downstroke of the key. Fig. 4ª is a modification of the parts shown in Fig. 4. This figure shows the parts in their normal positions. Fig. 5 is a sectional view of the machine cut through from front to rear on the line X X of Fig. 1. Fig. 6 is a view of the wheel-escapement of No. 6 Remington type-writer seen from the same position as Fig. 2. Fig. 7 is a view of the wheel-escapement and part of the machine-frame and carriage corresponding to Fig. 3, but looking at the machine in the opposite direction, since the dogs face in a direction opposite to that of dogs in Fig. 3. Figs. 8, 9, 10, 11, 12, and 13 are respectively plan and front views of the wheel-escapement mechanism. Figs. 8 and 11 show the normal position of the parts. Figs. 9 and 12 show the position at the end of the downstroke of the key. Figs. 10 and 13 show the parts during the reëngagement of the normally-engaging

members at about the middle of the return of the key to its lifted position. Fig. 11 is similar to Fig. 7, excepting that many parts shown in Fig. 7 are removed in Fig. 11. Fig. 14 represents a modification of the invention applied to the No. 2 Remington type-writer in which the impulse-spring is mounted on the dog.

Referring to Figs. 1 to 5, inclusive, the rack 1 is securely fastened to the rack-frame 2 and is hinged to the carriage 3 in engagement with the escapement-dogs and can be lifted up off from the dogs at will by depressing the carriage-release key (not shown) in the ordinary manner. Mounted upon the dog-carrying rocker or rocker-frame 4 are the two escapement-dogs—viz., the spacing-dog 5, which normally engages with the rack, and the swiveling dog 6, which is normally out of engagement with the rack. The rocker-frame is mounted upon pivots 7 7, which pass through lugs cast upon the machine-frame. The lower end of the rocker-frame is provided with an arm bent inwardly and extending toward the front of the machine and to which the usual cross-bar 8 is attached. The connecting-wires 9 9 hook over the bar 8 at each side of the machine, and at its opposite end each connecting-wire is fastened to the universal bar 10, which extends under all of the key-levers, so as to rock the dog-carrying frame 4 inwardly every time a key is depressed. The spacing-dog 5 is pivoted to the rocker-frame by screw 11, and it spaces backward and then forward in the direction of the rack-feed whenever it is disengaged and then reëngaged with the rack. When out of engagement with the rack, it is held in a position intermediate between the limits of its forward and backward vibrations on the rocker-frame by spring 12, (shown in dotted lines in Fig. 2 and in full lines in Fig. 2^a,) which engages with the lower end 5^d of the dog, both in front of and back of the dog, so as to permit the dog to be spaced forward with the rack by the pull of the mainspring and also to be spaced backward out of engagement with the rack whenever the carriage is retracted toward its initial or starting point without lifting the rack up off from the dog. Spring 12 is coiled about screw 12^d and is controlled by spring-holder 13, which is adjustable, being pivoted upon the screw 12^d and being provided with a slot and clamping-screw 13^a. This method of mounting the spacing-dog on the rocker-frame and controlling it normally in a central intermedate position by means of spring 12 is well known in the art, and it does not constitute any part of my invention.

The carriage-propelling mechanism is of the usual No. 2 Remington construction. It consists of a coiled carriage-mainspring 13^b, which is connected at its inner end to the mainspring-shaft. The rear end of the mainspring-shaft is slotted on two sides and the ratchet-wheel 13^d mounted thereon and screwed in place by clamping-screw 13^e, which is threaded into the end of the shaft, the construction being such that the shaft and ratchet-wheel can revolve together, but not independently of each other. Near the periphery of the ratchet-wheel a handle 13^f is mounted, extending rearwardly from the machine, whereby the mainspring may be wound up. The mainspring-shaft is journaled in a bearing upon the depending bracket 19. The ratchet-wheel 13^d is mounted upon the shaft to the rear of said bearing, and the mainspring 13^b, mainspring-fusee 13^g, and several other parts are mounted upon the shaft in front of said bearing. The mainspring is connected at its outer end with fusee 13^g by screw 13^h, which is threaded into the fusee. These parts are shown in Fig. 1^a, screw 13^h and the end of the mainspring connected therewith being shown in the drawing, the remainder of the mainspring being hidden by the guard-plate 13^i. The fusee 13^g is merely journaled upon the shaft as a bearing, so that it can revolve while the shaft remains stationary and remain stationary while the shaft revolves.

Mounted upon a lug prepared to receive it upon bracket 19 is the pawl or pallet 13^j, said pawl being journaled upon screw 13^k, which is threaded into the lug. The pawl or pallet 13^j is provided with teeth 13^m 13^m at its opposite ends, which alternately engage with the ratchet-wheel in the usual manner. Said teeth alternately work in the teeth of the ratchet-wheel when the mainspring is being wound up, while the ratchet-wheel is being turned by its handle 13^f, and one or the other of said teeth always serves to retain the mainspring in its wound-up position, according as the one or the other of the teeth of the pawl is in engagement with a tooth of the ratchet-wheel. The pawl 13^j is provided at one end with the handle 13^n, which extends rearwardly, whereby the two teeth 13^m 13^m may be alternately caused to engage with and disengage from ratchet-wheel 13^d for unwinding the mainspring. Fusee 13^g is connected with the carriage 3 by means of band 13^o, said band being connected with the fusee at one end by means of screw 13^p and at its opposite end with the carriage by means of a lug 13^q and screw thereon in the usual manner, said lug 13^q being shown partly in dotted lines in Fig. 1^a.

The spacing-dog 5 is mounted on the inner side of the rocker. Directly opposite the spacing-dog, on the outer or rear side of the rocker, is mounted the swiveling dog 6. Upon the outer side of rocker-frame is the lug 14, which is bored out to receive the shank of the swiveling dog. The swiveling dog is prevented from being lifted bodily up out of the rocker-frame by means of the screw 15, which is fastened in the bottom of the shank of the swiveling dog, as is shown by breaking away lug 14 in Fig. 2, said shank being bored out and threaded to receive the screw. A spring 16 is fastened to the frame by means of screws

17 17 and is provided with a slot 18 for raising and lowering the inner end of the spring. When the spring 16 is in the raised position shown, it performs no function; but when it is lowered by shifting the slot 18 downwardly beneath screw 17 the inner end of the spring rests, either in the normal position of the rocker-frame or after it has been swung inwardly, upon and is flexed by part 19 of the rear of the type-writer frame. In the latter case the spring 16 may be utilized to return the rocker-frame to normal position, and it is also useful for imparting a heavier tension to the keys when such tension is desired by the operator. I have also provided another spring 20. This spring performs a plurality of functions. One of these functions is to return the rocker-frame to normal position after a blow on the key. This function is possessed by spring 20 in common with spring 16 when the latter is adjusted as above described, and either of the springs may be made to effect the function independently or both springs may be utilized together. Another function of spring 20 is to space the swiveling dog 6 backward when out of engagement with the rack, so as to move that dog into position for engagement with the next succeeding rack-tooth. Spring 20 also performs the function of offering a resistance to the pull of the carriage-propelling power while the swiveling dog is engagedwith the rack, which varies at different periods of said engagement and varies with the strength of spring 20. For instance, if spring 20 is very strong relatively to the mainspring or other propelling power it will prevent the swiveling dog from being moved forward by the mainspring while in engagement with the rack. If the two springs are very evenly balanced, spring 20, being slightly the stronger while the key is fully depressed, may hold the dog backward at that time, whereas upon release of the key the pull of the mainspring becoming gradually stronger for swiveling the dog during the disengagement of the dog from the rack the swiveling dog will swing on its axis under the pull of the mainspring, and the carriage will be drawn forward while the swiveling dog is being disengaged from the rack. This imparts a very smooth feed to the carriage and will be hereinafter more fully described. If the pull of the mainspring is much stronger than the resistance offered by spring 20, dog 6 will be rapidly swiveled forward as soon as it is engaged with the rack, and when so swiveled presents its rack-engaging face at an incline to the direction of the feed of the rack or in an oblique direction to the feeding movement, so that the mainspring assists in disengaging the swiveling dog from the rack and reëngaging the spacing-dog therewith.

Spring 20 is mounted upon spring-holder 21 and is coiled around screw 22. Spring-holder 21 is bent up at right angles at the left end to form the part 23. Part 23 is provided with a hole 24, through which the rear end of spring 20 passes, and with a slot 25, through which the front end of spring 20 passes and in which it can play from one side to the other with swiveling dog 6 when the rocker-frame is swung in and out by the depression of the keys. Screw 26 is provided for more securely fastening holder 21 to the frame of the machine. If desired, the holder 21 may be provided with slots for adjustment under screws 22 and 26. The bent part 27 of holder 21 passes above the rack-frame 2 and prevents the rack from being lifted too high off from the dogs in the usual manner. The swiveling dog 6 is provided with an arm 28, substantially at right angles to the rack-engaging face of the dog. The spring 20 passes over the top of the swiveling dog and at its extreme end is bent downward and lies inside of the arm 28, as appears in Fig. 3. The spring is so tensioned that it constantly presses toward the rear of the type-writer against arm 28, and thus tends, first, to swing rack-engaging face of the swiveling dog 6 toward the left (see Fig. 1) or backward into line with spacing-dog 5, and, secondly, to swing the entire rocker-frame 4, with the dogs 5 and 6, toward the rear of the machine, so as to hold the spacing-dog 5 in engagement with the rack and swiveling dog 6 to the rear and out of engagement with the rack. Upon the depression of a key the swiveling dog is moved into engagement with the rack and the spacing-dog is moved out of engagement therewith, and then if the mainspring is relatively stronger than spring 20 the swiveling dog will be drawn forward or to the right in the direction of the arrow in Fig. 1 and present its engaging face at an incline or in an oblique direction to the rack, as is shown in Fig. 4. When the swiveling dog is in position shown in Fig. 4, the mainspring or other propelling power is brought into action with the escapement to disengage the swiveling dog from the rack and to reëngage the spacing-dog therewith, the inclined face of the swiveling dog acting as a cam for reëngaging the normally-engaging escapement members and for lifting the keys 29 29 and for returning each of the type-bars 30 30 from the printing-point at the platen 31 toward its normal position of rest in the basket 32. In my construction, therefore, the mainspring or other carriage-propelling power acts through the escapement to return the keys and all parts operatively connected therewith—as, for instance, the type-bars—to their normal positions. The type-bars are attached to and actuated by the key-levers 33 33 by means of the connecting-wires 34 34 and the turnbuckles 35 35 in the usual manner, and the usual adjustments are provided for connecting-wires 34 and also for the rocker-frame-connecting wires 9. As soon as dog 5 has been disengaged from the rack upon the depression of a key it is spaced backward by spring 12 in the usual manner and stopped in its normal central position, where it is controlled by

spring 12, until it is again moved into the rack upon the release of the key, and then the spring 12 is overcome by the more powerful carriage-mainspring 13^b and the dog 5 is again drawn forward under the influence of the mainspring into its normal carriage-holding position. (Shown in Fig. 2^a.) When in its normal central position, in which it is held by spring 12 when out of the rack, it should be properly positioned to reënter the rack and engage with the next succeeding rack-tooth upon the release of the key. If the spring 20, which holds the swiveling dog in its rearward position in opposition to the mainspring, is relatively so much stronger than the mainspring that the mainspring cannot swivel the dog forward at all, the dog 6 will operate in the same manner that the ordinary normally-disengaged fixed dog of the Remington rocker-frame operates—that is, there will be no forward feed of the carriage until after the swiveling dog has been wholly disengaged from the rack. Therefore in that case the normal central position in which the spacing-dog is held by its spring 12 should be directly in line with the open space in front of the next succeeding rack-tooth. In other words, the spacing-dog when disengaged from the rack by the depression of the key should be spaced backward and stopped in the same position which it would occupy if the dog 5 were a rigid dog of the usual Remington style. It is, however, preferable to make the strengths of the mainspring and of spring 20 relatively such that the swiveling dog will swivel more or less while in engagement with the rack, and the preferable amount of such swiveling movement of dog 6 varies under different conditions, as will be hereinafter pointed out. It is obvious that if dog 6 swivels while in its carriage-controlling engagement with the rack there will be a forward movement of the carriage, the extent of such forward movement of the carriage being proportional to the extent of such swiveling movement of the dog 6. Therefore the position of the open space in the rack in front of the rack-tooth with which the spacing-dog should be engaged upon the release of the key will be varied under different adjustments of the mainspring and spring 20 relatively to each other, and consequently it is desirable that the normal central position in which dog 5 is held by spring 12 should be correspondingly varied. I have provided for this by making the spring-holder 13 adjustable upon the rocker-frame 4. The normal central position in which the dog 5 is held on the rocker-frame by spring 12 can be varied by shifting the spring-holder on the rocker-frame, and the holder 13 should be shifted upon the rocker-frame to correctly position dog 5 thereon by its spring 12 whenever the forces of the mainspring and of spring 20 are changed with relation to each other.

It will be noted that in Fig. 1 the swiveling dog 6, which is shown in its rearward position, has its rack-engaging face in line with the rack-engaging face of dog 5 and at right angles to the direction of the feed of the rack 1. In Fig. 4^a I have shown a modification wherein the dog 6^y is also in its rearward position; but in this modification the rack-engaging face of dog 6^y while in its rearward position (shown in Fig. 4^a) is slightly inclined and presents its rack-engaging face to the rack at an angle. This construction assures that dog 6^y can readily enter the rack when dog 5 is disengaged therefrom, and at the same time, owing to the inclined face of the dog, at the end of the downstroke the dog wedges into the rack-tooth with which it engages and prevents any feed of the carriage while the key is fully depressed. This modification is advantageous, particularly where it is desirable to prevent any blur in the print, and consequently to prevent all feed of the carriage until after the printing has taken place.

In Figs. 6 to 13, inclusive, I have only shown the escapement mechanism. The connections of the keys and type-bars, &c., are not shown; but the keys, key-levers, type-bars, &c., are operatively connected with the escapement in this construction in the ordinary way in a manner substantially the same as that in which they are connected with the escapement in the construction of Figs. 1 to 5, inclusive.

The feed-rack 50 is mounted on the carriage 51 and engages with pinion 52. The pinion is fastened to the inner end of the shaft journaled in bracket 53, and the escapement-wheel 1^a is mounted on the outer end of the shaft. Escapement-wheel 1^a is referred to broadly in the accompanying claims by the term "rack." The dog-rocker 4^a is pivoted on dependent bracket 56. The dog-rocker is provided with two pivoted dogs 5^a and 6^a, which alternately engage and disengage with the escapement-wheel, so as to permit the escapement-wheel to rotate step by step under the influence of the mainspring, (not shown,) and thus feed the carriage. Dog 5^a engages with the escapement-wheel during the normal unused condition of the machine. This dog is of the usual style and spring-pressed in the usual manner by spring 12^a. So long as dog 5^a is engaged with the escapement-wheel it is drawn to the limit of its forward movement in contact with screw 60. Dog 6^a is normally out of engagement with the escapement-wheel. Upon depression of any type-key (not shown) for printing the dog-rocker is rotated on its axis, and the dogs are moved inward, so that dog 5^a is disengaged from the escapement-wheel and dog 6^a simultaneously engaged therewith. Dog 5^a is then spaced backward by spring 12^a away from screw 60 and into position for reengagement with the next succeeding tooth of the escapement-wheel as soon as the type-key is released. All of the above parts (excepting dog 6^a) are of the usual style and op-

erate in the usual manner, and there is the usual open space between the adjacent edges of the two dogs.

In the above description I have stated that dog 5^a is spaced forward by the mainspring into contact with screw 60 and backward by spring 12^a into position for reëngagement with a succeeding tooth. By the "forward" spacing of the dog I mean the direction in which it is moved by the mainspring or other carriage-propelling power, and by the "backward" spacing I mean its movement in the direction opposite to that in which it is spaced by the mainspring. The same definitions will also apply to the swiveling or spacing of dog 6^a on the dog-rocker. From the above definitions it will be seen that I apply the terms "forward" and "backward" to the movements of the dogs upon their pivots. The dog-rocker also has the usual inward and outward movement on the machine by rotation on its axis, as above described. Normally or in the unused condition of the machine the dog-rocker is moved by spring 16^a to the limit of its outward movement, with stop-screw 63 in contact with bracket 56 and dog 5^a engaged with the escapement-wheel. The escapement members are then in engagement. When a type-key is depressed, the dog-rocker is rocked to the limit of its inward movement, so that buffer-stop 64 contacts with bracket 56, dog 5^a is disengaged from the escapement-wheel, and dog 6^a engaged therewith. The escapement members are then disengaged.

The terms "engaging" and "disengaging" members of the escapement as used herein are intended to include an escapement wherein one of the two members has two elements, as, say, the two dogs in the drawings. The term "engagement" designates the normal engagement of the members when the machine is at rest and the term "disengagement" designates the relation of the members opposite thereto. To illustrate, the members are engaged in Figs. 1, 3, and 11 and they are disengaged in Figs. 4, 5, and 12.

In this construction my invention relates to dog 6^a and the parts connected thereto and operative therewith. These will now be fully described and their mode of operation clearly pointed out.

Dog 6^a consists of the rack-engaging part 65, the arm 28^a, which engages with spring 20^a, and the pivotal shaft 66. It also comprises the banking-stops 67 and 68, which limit its movements in either direction on the dog-rocker. The rack-engaging part 65, the shaft 66, arm 28^a, and the banking-stops 67 and 68 are all formed in one piece. The dog is journaled on the dog-rocker in bearings 14^a and 14^b, which are cast integral with the dog-rocker and are bored out to receive shaft 66. A collar 15^a is secured on shaft 66 below journal 14^b by pin or in any other suitable manner to prevent the dog from accidentally being lifted up out of its proper position on the dog-rocker.

On the top of the machine-frame is mounted spring 20^a, which performs the same functions that are performed by spring 20 in the constructions of Figs. 1 to 5. Spring 20^a is fastened upon spring-holder 21^a and is coiled around screw 22^a. Spring-holder 21^a is bent up at right angles at the left end to form the part 23^a. Part 23^a is provided with a slot 25^a, through which the inner end of spring 20^a passes and by which the spring is held under tension and in which the inner end of the spring which engages with dog 6^a plays. The outer end of spring 20^a passes through a hole in part 23^a. Screw 26^a is provided for more securely fastening holder 21^a to the machine-frame. The swiveling dog is provided with an arm 28^a for engagement with spring 20^a, as was described in the discussion of Figs. 1 to 5. Spring 20^a engages with arm 28^a and actuates the swiveling dog 6^a and the rocker-frame 4^a in the same manner that spring 20 actuates dog 6 and rocker-frame 4. The spring is so tensioned that it tends to both retract the dog-rocker and also to swivel the dog to rotate it in its journals to the limit of its backward movement with the banking-stop 67 in contact with the banking-pin 79, which pin is inserted in the top of bearing 14^a to engage with banking-stops 67 and 68 to limit the forward and backward movements of dog 6^a on the dog-rocker.

The operations of the parts are as follows: Referring particularly to the construction of Figs. 1 to 5, inclusive, dog 5 normally engages with the rack and dog 6 is normally disengaged, but is spaced to the limit of its backward movement in position for engagement with the rack. Upon depression of a type-key 29 the rocker 4 is rotated upon its axis, so that dog 5 is disengaged from the rack and dog 6 engaged therewith. As soon as dog 5 is fully disengaged from the rack the pull of the mainspring or other carriage-propelling power tends to feed the rack and the carriage forward and to cause the dog 6 to swivel on its axis into the position shown in Fig. 4. Spring 20 offers a resistance to the pull of the mainspring and tends to hold dog 6 in the position shown in Fig. 1. The question whether the mainspring shall cause dog 6 to swivel on its axis into the forward position (shown in Fig. 4) or the spring 20 shall hold it in its backward position (shown in Fig. 1) depends, as above stated, on the relative strength of the mainspring and of spring 20. If spring 20 is sufficiently strong, it will prevent any swiveling of the dog on its axis until after the release of the depressed key. On the other hand, if dog 6 swivels into its forward position as soon as dog 5 is disengaged from the rack the carriage will begin its feeding movement prior to the instant when the printing occurs, and therefore there will be more or less liability to blur in the

print—that is, in case a very quick feeding movement is required the mainspring should be relatively strong enough to cause dog 6 to swivel on its axis as soon as dog 5 is disengaged from the rack, and this tends to cause blurring in the print. In this case, however, the liability of blurring in the print is greatly lessened by the fact that the dog 6 presents its engaging face to the rack obliquely, and therefore the pull of the mainspring is transmitted through the rack to the oblique face of dog 6, and thus operates upon rocker-frame 4, tending to return the rocker-frame to its normal position, together with the parts connected therewith, including the key-levers and type-bars. The mainspring therefore in this case acts as a repulser and tends to quickly lift the key and throw the type-bar and the type away from the platen without blurring. In addition to the repulser effect of the mainspring above referred to the swiveling of dog 6 causes arm 28 to swing inwardly, and this imparts a greater tension to spring 20 near the end of the downstroke of the key. I also find it advantageous to locate spring-holder 21 on the machine in such a position that at about the end of the downstroke spring 20 will engage with the part 23 at the inner end of slot 25. This should occur just before the end of the downstroke, and its effect is to impart an additional tension to spring 20, and to thus cause a decided repulser to be transmitted by spring 20 to dog 6 and rocker-frame 4, and thereby to the keys 29. I have placed the rack-engaging face of dog 6 somewhat to the rear of the pivotal center of the dog or upon the left-hand side thereof, as seen in Fig. 1, and as arm 28 is still farther to the rear of the pivotal center the swiveling of the dog causes arm 28 to rapidly swing inwardly when the dog swivels forward, thus quickly imparting the additional tension to spring 20 and to the keys 29. While the highest speed of the carriage-feed is obtained by tensioning the mainspring sufficiently to swivel dog 6 into its forward position as soon as dog 5 is disengaged from the rack, still I find it advantageous even in this case to make spring 20 stout enough so that it offers a material resistance to the mainspring. Such adjustment results in a very smooth feed of the carriage, whereas if spring 20 be made so weak as not to offer a material resistance to the mainspring the mainspring will pull the carriage forward with a jerk each time dog 5 is disengaged from the rack. Moreover, by making spring 20 comparatively strong the rocker-frame will thereby be restored to normal position more rapidly after the release of the key and may be so restored without any assistance from spring 16. It will be noticed that I have provided slot 25 and the hole 24 for the reception of the two ends of spring 20 and that the slot and hole are separated from each other by a tongue in the spring-holder 21. This tongue may be used as a stop to limit the rearward movement of the dog-engaging end of spring 20, so that after spring 20 has moved the rocker-frame to the rear sufficiently to disengage dog 6 from rack 1 any further movement of spring 20 to the rear will be prevented by the tongue in the spring-holder 21. (See Fig. 3.) This adjustment and construction is advantageous in permitting the type-keys to be slightly depressed and the type-bars slightly started toward the platen before any resistance from spring 20 is encountered on the keys. This results in an agreeable "touch" for the operator. In any case where it is desirable that the carriage should not commence to feed until after the printing has occurred the strengths of the mainspring and of the swiveling-dog spring should be so proportioned relatively to each other that the mainspring will not cause the swiveling dog to swivel until after the printing, but will then cause it to swivel during the latter part of the disengagement of the swiveling dog from the rack. This result can be readily accomplished, for the reason that during the disengagement of the swiveling dog from the rack the distance from the pivotal center of the swiveling dog to the edge of the rack is constantly increasing, thus offering a better and better leverage for the mainspring to act on to swivel the dog into its forward position. The pull of the mainspring, therefore, becomes more and more effective to cause the swiveling dog to swivel into its forward position during the disengagement of the dog from the rack, and, on the other hand, since the swiveling dog is swinging toward the rear with the rocker-frame during its movement out of engagement with the rack the tension of the swiveling-dog spring tending to hold the dog in its rearward position becomes less and less during the disengagement of the swiveling dog. Hence the ability of the swiveling-dog spring to hold the swiveling dog in its rearward position in opposition to the pull of the mainspring becomes less and less during the disengaging movement of the swiveling dog from the rack. Therefore it is clearly apparent that the strength of the swiveling-dog spring and the pull of the mainspring may be so proportioned relatively to one another as to prevent any feed of the carriage during the downstroke of a type-key and at the instant of printing, and still be so proportioned relatively to each other that the swiveling dog will be moved into its forward position during the disengagement of the swiveling dog from the rack after the printing has taken place. In the construction of Figs. 1 to 5 I have shown the swiveling dog moved into its forward position at the instant of printing. (See Figs. 4 and 5.) Hence in that construction I have so proportioned the strengths of the two springs that the mainspring overcomes the swiveling-dog spring and feeds the carriage forward prior to the printing. On the other hand, in the construction of Figs. 6 to 13 I have so propor-

tioned the two springs that no feed of the carriage occurs prior to the printing, but so that the mainspring swivels dog 6^a forward after the printing and while the dog is being disengaged from the rack. In this construction in Figs. 9 and 12 I show the position of the parts at the instant of printing, and it will be seen by an examination of Fig. 9 that dog 6^a is held in its rearward position by spring 20^a at the instant of printing. Figs. 10 and 13 show the parts after the printing, during the disengagement of dog 6^a from the rack, and an examination of Fig. 10 shows that the mainspring has swiveled dog 6^a into its forward position during the disengagement of the dog from the rack. The reason why the mainspring cannot overcome the swiveling-dog spring and cause the dog to swivel during the downstroke of the key, with the tension, as shown in Figs. 6 to 13, is that the carriage being at rest during the downstroke of the key the dog 6^a becomes fully engaged with the rack before the mainspring has time to act strongly on the dog.

I wish to call attention to the fact that in case the swiveling dog swivels into its forward position prior to the printing the carriage will feed forward until the swiveling dog reaches the limit of its forward movement, and then the carriage will continue to feed forward along the inclined face of the dog while the swiveling dog is being disengaged from the rack, or else it will be cammed backward again in the opposite direction if a key is still further depressed after the mainspring has moved the dog to the limit of its forward vibration on the rocker-frame. In case the adjustments are such that a slight backward or camming action is imparted to the carriage by means of the obliquely-swiveled face of the dog at the end of the downstroke of the keys, as just described, an additional repulser effect is thereby transmitted to the keys, and such additional repulser effect may, if desired, be utilized to still further reduce the liability of blurring in the print.

It will be noted that in the constructions of Figs. 1 to 13, inclusive, I have shown spring 20 of the construction of Figs. 1 to 5 and spring 20^a of the construction of Figs. 6 to 13 as supported independently of the rocker-frame on the machine-frame from off the pivotal line of the rocker-frame and as spring-pressed, respectively, against dogs 6 and 6^a. In these two constructions the dog-springs 20 and 20^a are each fastened to the machine-frame and operatively connected with the dogs. In the construction of Fig. 14, on the other hand, I have shown the dog-spring 20^b fastened on the dog 6^b by screws or in any other suitable manner and spring-pressed against antifriction-roller 90. Roller 90 is mounted upon stud or screw 91, so that the roller revolves freely as spring 20^b moves across it when the rocker-frame is vibrated inwardly and outwardly on its pivots. The remainder of this construction may be similar to the construction of Figs. 1 to 5. Springs 20, 20^a, and 20^b are all equivalents of each other in so far as the functions of restoring the rocker-frame to normal position and of positioning the dog thereon are concerned.

The spring-holders 21 of Figs. 1 to 5 and 21 of Fig. 4^a and 21^a of Figs. 6 to 13 may each of them be made adjustable on the machine-frame, if desired. If they are thus made adjustable, the tensions with which springs 20, 20^y, and 20^a, respectively, act on arms 28, 28^y, and 28^a of the several constructions will be varied whenever the spring-holders are shifted on the machine-frames. In Figs. 1 and 4 I have shown a slot 26^b underneath screw 26. In this construction the spring-holder 21 can be shifted about screw 22 as a pivot, so as to adjust the end 23 of the holder inward to lessen the tension of spring 20 upon arm 28 or outward to increase the tension of the spring on the dog. In Fig. 4^a I have not shown any adjusting-slot, and consequently the holder is not adjustable on the machine. In Figs. 8, 9, and 10 I have shown a slot 22^c underneath screw 22^a for adjusting spring-holder 21^a about screw 26^a as an axis. In the constructions of Figs. 1 to 5 and Figs. 6 to 13 if spring-holders 21 and 21^a are shifted it is obvious that slots 25 and 25^a will also be shifted and that the inner portions of bent-up parts 23 and 23^a will thus be shifted. In case the slots 25 and 25^a are made so that either or both ends of the slots bear against springs 20 and 20^a during any part of the movement of the rocker-frames it is obvious that the inner portions of the bent-up parts will bring the repulser effect into action at an earlier or later part of the stroke on the keys, according to the positions of the spring-holders, and that the outer portions of the bent-up parts next to the slots will check the action of the springs 20 and 20^a in returning the rocker-frames to their normal positions at a correspondingly earlier or later part of the return of the rocker-frames to normal position; but I do not wish to limit my invention to making slots 25 and 25^a of such widths that one or both ends of the slots will bear against the springs at some part of the movement of the rocker-frames. The slots may be so made and used advantageously whether the spring-holders are adjustable or not; but I wish to have it understood that the part of my invention which relates to the varying of tensions of the dog-springs relates, broadly, to the tensioning of such springs irrespective of the widths of the slots in the holders.

Referring to Fig. 3 of the drawings, in the bent-up part 23 of the spring-holder at the inner end of the slot 25 there is a stop or wall 23^b, and at the outer end of the slot there is another stop or wall 23^c, the wall 23^c being the unperforated portion of the bent-up part 23 between the slot 25 and the hole 24. These two stops or walls 23^b and 23^c may each be made to perform functions in the operation

of the escapement aside from that of forming the end walls to the slot 25. The wall or stop 23^c may be so made or the spring-holder 21 may be so adjusted that the spring 20 will collide with the stop 23^c during the return movement in the escapement and before the rocker-frame has been wholly returned to its normal position. In this event the rearward movement of spring 20 in slot 25 will be terminated while the dog 6 is still being rocked back to its normal position, and the stop 23^c will serve to hold the spring 20 out of engagement with the arm 28 of dog 6 in the normal position of the rocker-frame, resulting in an agreeable key action in the machine. The wall or stop 23^b may also be so made or the spring-holder 21 may be so adjusted that during the forward rocking movement of the rocker-frame upon depression of a key the spring 20 will be brought into collision with stop 23^b before the key is wholly depressed. In this event the spring 20 will first be flexed or bent between its fixed point—viz., the screw 22 and the arm 28 of the dog 6—such flexure being caused by the initial inward movement of rocker-frame 4 and dog 6 thereon in the machine during the first part of the depression of a key. When the key has been so far depressed that spring 20 is brought into contact with stop 23^b, the fixed holding-point of the spring is shifted from screw 22 to stop part 23^b, and consequently upon further inward movement of the dog during the latter part of the depression of the key the length of the spring that is flexed by such subsequent movement of the dog is shortened from the distance between screw 22 and arm 28 to the distance between stop 23^b and arm 28, this resulting in a repulser effect on the key.

The above discussion of Fig. 3 and walls or stops 23^b and 23^c therein applies equally to the structure shown in Fig. 9. In this latter figure the bent-up end 23^a of the spring-holder is provided with the stop or wall 23^d, corresponding to the stop 23^b of Fig. 3, and with the stop or wall 23^e, corresponding to the stop 23^c of Fig. 3, and the spring-holder 21^a is provided with adjustments similar to the adjustments of spring-holder 21 of Fig. 1, whereby the spring-holder 21^a may be so adjusted as to cause either of the stops 23^d or 23^e to perform the same functions as the functions described of stops 23^b and 23^c of Fig. 3.

I have stated above that in case the spring 20 for the swiveling dog is so stout that the mainspring cannot swivel the dog in opposition to the swiveling spring 20 there will be no forward feed of the carriage until after the swiveling dog has been wholly disengaged from the rack. That statement is a broad statement of the operation of the parts when the swiveling spring is free to actuate the dog so long as the dog is engaged with the rack, but the statement does not apply in case the spring-holder 21 is so placed upon the machine that the stop 23^c engages the spring 20 before the swiveling dog 6 has been disengaged from the rack. In that case as soon as the rearward movement of the spring 20 has been checked by collision of the spring with the stop 23^c the spring 20 cannot exert any further influence to hold the swiveling dog in its rearward position in opposition to the pull of the mainspring, and accordingly the mainspring will swivel the dog into its forward inclined position; but in thus swiveling the dog into its inclined position the mainspring will disengage the dog from the rack, the free end of the arm 28 remaining in contact with the spring 20 and serving as a fulcrum to swing the rocker-frame rearwardly or return it to normal position by the force of the mainspring while the dog is being swiveled forward thereby. In this last-described construction, therefore, with the swiveling spring relatively stronger than the mainspring and normally abutting against the stop 23^c the end of the spring which contacts with the arm 28 serves as a fixed stop to swivel the dog rearwardly while it is being moved into engagement with the rack and whereby arm 28 is held as by a fulcrum operated upon by the mainspring to restore the rocker-frame to its normal position while it is swiveling the dog forward after the release of the key. A function of the spring over that of a mere fixed stop is to yield and permit a further inward movement of the dog into the rack than could be had if a fixed unyielded stop were used.

By varying the tensions of springs 20 and 20^a, as above described, and without changing the tension of the carriage-propelling power I am enabled to either hold dogs 6 and 6^a at the limits of their backward movement on the rocker-frames 4 and 4^a, and thus prevent feed of the carriage until after the printing has taken place by making the tensions of springs 20 and 20^a sufficiently strong, or by lessening the tensions of the springs 20 and 20^a I am enabled to permit the carriage-propelling power to overcome the springs and feed the carriage prior to the printing. I can of course also obtain the same results by varying the tension of the carriage-propelling power without changing the tensions of the dog-springs. I can also increase the speed of the carriage-feed without permitting any feed of the carriage prior to the printing by increasing the tension of the carriage-propelling power and by shifting the spring-holders 21 and 21^a sufficiently to impart the necessary additional tensions to springs 20 and 20^a, and in like manner I can lighten the touch on the type-keys where high speed of the carriage-feed is not required by lessening the tensions of the dog-springs and by correspondingly lessening the tension of the carriage-propelling power. Without varying the tensions of springs 20 and 20^a and without varying the tension of the mainspring 13^b I can permit or prevent feed of the carriage while the keys are wholly depressed by lengthening or short-

ening the rocker-frame-connecting wires 9 9 or by lengthening or shortening the type-bar-connecting wires 34 34. If I shorten the rocker-frame-connecting wires 9 9, the rocker-frame will be swung farther inward when the keys are totally depressed and their connected type at the printing-point, so that the more I shorten connecting-wires 9 9 the nearer the pivot of the swiveling dog will be in line with the rack when a key is depressed, and by shortening the connecting-wires 9 9 sufficiently so that the pivot of the swiveling dog will be wholly in line with the rack when a key is fully depressed all feed of the carriage will be prevented, regardless of the tension of the mainspring, since in this case the mainspring will pull directly against the pivot of the swiveling dog. In this case the let-off in the escapement would be very early in the stroke on the key—considerably before the type reaches the printing-point. On the other hand, by lengthening the connecting-wires 9 9 sufficiently so that the type will be just arriving at the printing-point when the let-off in the escapement takes place the full leverage of the swiveling dog will be presented to the action of the mainspring, whereby the mainspring will exert its greatest force for swiveling the dog while the key is fully depressed. The let-off should, however, take place while not too early in the stroke—somewhat before the type is brought to the printing-point—so as to insure proper spacing, and if with such an adjustment the mainspring swivels the dog while the key is fully depressed and it is desirable to avoid this without changing the tension of the mainspring or of springs 20 and 20[a] this can be done by shortening connection-wires 9 9, so as to cause the let-off in the escapement to take place somewhat earlier during the stroke on the keys. Similar results can be obtained in the case of individual keys and type-bars by lengthening or shortening the type-bar-connecting wires 34, and thereby varying the period in the stroke on a key when the let-off in the escapement takes place. I wish to call particular attention to the fact that with the escapement herein described the let-off with all of the keys should be very exact, in order that the action of the machine shall be uniform with all of the keys. This is a matter of much importance with my herein described escapement, since it is desirable that feed of the carriage be prevented until after the printing with all of the keys, or else that each of the keys shall permit feed of the carriage prior to the printing; and since with my herein-described escapement the period at which the carriage-feed occurs depends largely upon the time of the let-off in the escapement the adjustments between the escapement and the keys taken collectively as well as individually should be accurate, and accordingly the lengths of the rocker-frame-connecting wires 9 9 and type-bar-connecting wires 34 34 should all be carefully regulated.

The usual key-lever springs 33[a] normally hold the key-levers 33 in their elevated positions, the upward movement of the key-levers being limited by a rubber cushion 33[b]. While the keys are in their normal positions resting against the cushion 33[b], the type-bars 30 lie in the basket 32, the connecting-wires 34 being so adjusted that the type-bars will lie in the basket in their normal positions of rest while the key-levers are in their normal positions up against the cushion 33[b]. In the Remington machine there is a certain amount of looseness between the upper ends of the connecting-wires 34 and the short arms of the type-bars to which they are attached. This looseness is ordinarily taken advantage of to start the depression of the keys slightly before the type-bar movement is begun, the reason being that the touch is more agreeable to the operator. The looseness between the type-bars and connecting-wires is also taken advantage of by thereby varying the extent of the depression of the keys before the type-bar movement begins in adjusting the machine, so that each of the type will arrive at the platen when the rocker-frame has been moved to the same extent by each of the key-levers. The connecting-wires can be lengthened or shortened by disconnecting their upper ends from the type-bars in the usual manner and screwing them into or out of the usual turnbuckles 35, as is ordinarily done when adjusting any Remington typewriter. In case the rocker-frame-connecting wires 9 9 or the type-bar-connecting wires 34 34 are so adjusted that the rocker-frame is swung inwardly far enough to bring the pivot of the swiveling dog 6 in line with the rack there can be no swiveling of the dog or feed of the carriage while a key is fully depressed, because the pivot of the dog being rigidly fixed on the rocker-frame then operates in connection with dog 6 in the same manner that the ordinary rigid dog of the Remington type-writer operates to hold the rack. Upon the release of the key while the rocker is being returned to normal position the dog 6 will be swiveled on the rocker-frame as soon as that dog has been so far withdrawn from the rack that the mainspring operates thereon to swivel the dog with greater force than that which spring 20 exerts thereon to prevent such swiveling movement.

In the claims I have specified a moving part operatively connected with the free end of a pivoted spacing-rocker and also operatively connected with a part mounted on the machine independently of the spacing-rocker, whereby said moving part is caused to move upon the spacing-rocker and relatively to the spacing-rocker when a key-lever is depressed. An example of such a moving part is the swiveling dog 6 of the construction shown in Figs. 1 to 5. This moving part (said swivel-

ing dog 6) is operatively connected with the free end of the upwardly-extending arm of the rocker-frame 4, and it is also operatively connected with the spring 20, said spring 20 being mounted on the machine independently of the rocker-frame. Another example of such a moving part is swiveling dog 6^a of Figs. 6 to 13. Still another example of such moving part is the dog 6^b of Fig. 14, which is operatively connected with the upper end of the arm of the rocker-frame and is also operatively connected with the roller 90, which is mounted on the machine independently of the rocker-frame. Still another example is the dog 6^y of the construction shown in Fig. 4^a. In each of the examples referred to the operative connection of said moving part with the rocker and also with a part mounted on the machine independently of the rocker constitutes a means whereby the force of the carriage-propelling power is operative for returning the rocker to its normal position after it has been moved, and in each of said examples it is obvious that the face of said moving part which is in engagement with the rack after the release of the key during the return movement of the parts to their normal position is arranged at an angle to its plane of movement.

Having thus described my invention and without limiting myself to the precise details shown, what I claim, and desire to secure by Letters Patent, is—

1. In a type-writer escapement, the combination with a rack, of a pivoted spacing-rocker operatively connected with the key-levers to be vibrated thereby and provided with an arm extending from the pivotal portion and free to swing at its opposite end, a moving part operatively connected with the free end of said arm to be moved into engagement with the rack by the swinging of the arm upon depression of a key-lever, said moving part being also operatively connected with a part mounted on the machine independently of said rocker for movement upon the rocker and relatively thereto, substantially as described.

2. In a type-writer escapement, the combination with a rack, of a pivoted spacing-rocker operatively connected with the key-levers to be vibrated thereby and provided with an arm extending from the pivotal portion and free to swing at its opposite end, a moving part operatively connected with the free end of said arm to be moved into engagement with the rack by the swinging of the arm upon depression of a key-lever, said moving part also being operatively connected with a part mounted on the machine independently of said rocker to control the carriage while a key is depressed and whereby the force of the carriage-propelling power is operative for returning the rocker to its normal position after it has been moved, substantially as described.

3. In a type-writer escapement, the combination with a rack, of a pivoted spacing-rocker operatively connected with the key-levers to be vibrated thereby and provided with an arm extending from the pivotal portion and free to swing at its opposite end, a moving part operatively connected with the free end of said arm to be moved into engagement with the rack by the swinging of the arm upon depression of a key-lever, said moving part also being operatively connected with a part mounted on the machine independently of said rocker to control the carriage while a key is depressed, and a face on said moving part which is in engagement with the rack after the release of the key and arranged at an angle to its plane of movement, substantially as described.

4. In a type-writer, the combination with a carriage and its propelling power, of an escapement therefor comprising a spacing-rocker having a moving part mounted thereon, a rack, means for actuating the rack by said propelling power and for thereby spacing said moving part forward on the rocker while it is engaged with the rack, and a spring supported independently of the rocker for disengaging said moving part from the rack and for spacing it backward on the rocker as soon as it has been disengaged from the rack, substantially as described.

5. In a type-writer, the combination with a carriage and a mainspring therefor, of an escapement for the carriage comprising a rocker-frame having a dog swiveled thereon, a rack, means for actuating the rack by the mainspring and for thereby swiveling said dog forward on the rocker-frame while it is engaged with the rack, and a spring supported independently of the rocker-frame for disengaging said dog from the rack and for swivelling it backward on the rocker-frame as soon as it has been disengaged from the rack, substantially as described.

6. In an escapement, the combination with a rack, of a spacing-rocker and a pivoted dog mounted thereon, a spring supported independently of the rocker but operatively connected with the dog to hold the rocker in its normal position and to return it to its normal position when it has been moved, and means for adjusting the tension of said spring, substantially as described.

7. In a type-writer escapement, the combination of a spacing-rocker, a pivoted dog mounted thereon, a spring supported independently of the rocker for positioning said dog, and means for adjusting the tension of said spring, substantially as described.

8. In a type-writer escapement, the combination of a spacing-rocker, a pivoted dog mounted thereon, a spring for both positioning the rocker and for positioning the dog in relation thereto, and means for adjusting the tension of said spring, substantially as described.

9. In a type-writer, the combination with a carriage, of carriage-propelling power and an escapement, a spring connected with said escapement, a key for moving the escapement against the spring, means for bringing the carriage-propelling power into action through said escapement-spring to lift the key when the key is depressed, and means for adjusting the tension of said escapement-spring, substantially as described.

10. In an escapement, the combination of two pivoted dogs, each of which moves on its pivot to effect the spacing, a spring supported independently of the rocker for positioning one of said dogs, and means for adjusting the tension of said spring, substantially as described.

11. In a type-writer escapement, the combination of a spaced member and a spacing member, carriage-propelling power which feeds the spaced member, a part in one of said members normally free from the other member but adapted to yieldingly contact therewith in antagonism to said propelling power, means operated by a key for causing said part to contact with the other member, said means being increasingly antagonistic to the propelling power during the depression of the key, to a degree sufficient to prevent feed of the spaced member by the propelling power while the key is fully depressed, substantially as described.

12. In a type-writer escapement, the combination of a spaced member and a spacing member, carriage-propelling power which feeds the spaced member, a part in one of said members normally free from the other member but adapted to yieldingly contact therewith in antagonism to said propelling power, an escapement wheel and pinion constituting a power-reducing gearing between the propelling power and spacing member, means operated by a key for causing said part to contact with the other member, said means being increasingly antagonistic to the propelling power, to a degree sufficient, in conjunction with said power-reducing gearing, to prevent feed of the spaced member by the propelling power while the key is fully depressed, substantially as described.

13. In a type-writer, the combination with a carriage and its propelling power, of an escapement therefor comprising a rack and a swiveled dog which can be engaged with the rack at different distances from its swiveling-point, whereby the swiveling pull of the carriage-propelling power on the dog when the rack is in engagement therewith varies at different periods of the said engagement, and a spring mounted upon a fixed part of the machine, acting upon the escapement mechanism through the dog to disengage the dog from the rack and to swivel it in opposition to the carriage-propelling power, whereby the power exerted by the dog-spring to swivel the dog when the latter is engaged with the rack varies inversely with the power exerted on the dog in the opposite direction by the carriage-propelling power, substantially as described.

14. In a type-writer, the combination with a carriage and a propelling power therefor, of a rack and a rocker-frame having a dog swiveled thereon which can be engaged with the rack at different distances from its swiveling-point, whereby the swiveling pull of the carriage-propelling power on the dog when the latter is in engagement with the rack varies at different periods of said engagement, and a spring bearing upon the dog and supported independently of the rocker-frame and from off the pivotal point of the latter, substantially as described.

15. In a type-writer escapement, the combination of a spring acting upon a movable part of the escapement and having bearings at its opposite ends and flexed between such bearings upon the initial movement of such part of the escapement, and a stop engaging the spring at an intermediate point upon the subsequent movement of the movable part, whereby the length of the spring that is flexed by such subsequent movement is shortened, substantially as described.

16. In a type-writer escapement, the combination with a rocker-frame, having a pivoted dog thereon, a spring, a spring-holder engaging one end of the spring and having a limiting-stop to hold the opposite end of the spring out of engagement with the dog in the normal position of the dog, and a limiting-face to engage an intermediate portion of the spring when the latter has been flexed by the movement of the rocker, substantially as described.

17. In a type-writer escapement, the combination with a rocker-frame having a pivoted dog thereon, a spring supported independently of the rocker-frame and acting upon the dog when the rocker-frame is swung, and a stop to hold the spring out of engagement with the dog in the normal position of the rocker-frame, substantially as described.

18. In a type-writer escapement, the combination with a machine-frame, of a rocker-frame pivoted to rock thereon, a dog swiveled upon the rocker-frame, and having a shoulder projecting therefrom, and a spring mounted on the machine-frame to one side of the rocker-frame, the free end of the spring projecting over the swiveled dog and being bent to engage the shoulder thereon, substantially as described.

19. In a type-writer escapement, the combination of a rocker-frame, a spring having a flat portion pivoted thereon and an extending arm, the flat portion being provided with a slot and a clamping-screw extending through the slot into the rocker-frame, whereby the extending arm of the spring may be adjusted in position, substantially as described.

20. In a type-writer escapement, the combi-

nation with a spring, of a holder therefor having a flat base provided with a pivotal aperture and a clamping-slot, whereby the holder may be adjusted to vary the pressure exerted by the spring, and screws inserted respectively through the pivotal aperture and through the clamping-slot, substantially as described.

Signed by me in New York city this 27th day of December, 1898.

CHARLES H. BELL.

Witnesses:
MINNIE C. EIGENRAUCH,
ABRAM COLE.